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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/934,643	08/23/2001	Hideyuki Arakawa	401346	8744

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EXAMINER

LEE, HSIEN MING

ART UNIT PAPER NUMBER

2823

DATE MAILED: 02/28/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/934,643

Applicant(s)

ARAKAWA, HIDEYUKI

Examiner

Hsien-Ming Lee

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 22 November 2002.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,4-7,9 and 10 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,4-7,9 and 10 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

1. Applicant's cancellation to claims 2, 3, and 8 is acknowledged. Claims 1, 4-7, 9 and 10 are pending in the application.
2. The 102(e) rejection to claims 1-3 and 7-10 and 103(a) rejection to claims 4-6 as set forth in the previous office action are withdrawn in response to applicant's amendment filed 11/22/02.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 1, 4, 7, 9 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over applicant's admitted prior art (hereinafter refers to as "AAPA") in view of Masahiro et al. (JP 08-186117).

In re claims 1, 7, 9 and 10, AAPA in Figs. 8-15 and related text teaches the claimed method and device, comprising:

- joining a first ball 2 formed at a tip end of a bonding wire 1 to a first conductive layer 10 (Fig.10);
- joining a first part of said bonding wire 1 (i.e. an angled portion of the bonding wire 1 located under a capillary 4 as shown in Fig.10) to a second conductive layer 6 via a stud bump 9 (Fig.11);

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- mechanically deforming the bonding wire 1 by bending the bonding wire 1 using a bonding tool such as the capillary 4 (Figs.10-11); and
- joining the first part of said bonding wire 1 on the second conductive layer 6 via stud bump 9 (Fig.11);

wherein said mechanically deforming the bonding wire 1 includes bending and curving the bonding wire 1 on the second conductive layer 6 ; and the bonding wire 1 is held by the bonding tool 4 and mechanically deforming the bonding wire 1 on the second conductive layer 6 by moving the bonding tool 4 with the bonding wire 1 being joined to the second conductive layer 6.

In contrast, AAPA do not teach mechanically deforming a second part of said bonding wire, while said first part of said bonding wire is joined to the second conductive layer, so that said bonding wire is folded onto said first part of said bonding wire directly opposite said second conductive layer; and joining said second part of said bonding wire to said first part of said bonding wire on said conductive layer.

Masahiro et al. (JP' 117), however, in an analogous art of a wire bonding teach mechanically deforming a second part of said bonding wire, while said first part of said bonding wire is joined to the second conductive layer 9/13, so that said bonding wire is folded onto said first part of said bonding wire directly opposite said second conductive layer 9/13; and joining said second part of said bonding wire to said first part of said bonding wire on said second conductive layer 9/13, i.e. the second ball 9 bonding is performed by two-step joining (Figs.3(a)-3(f)) by mechanically deforming the bonding wire 4 via moving the capillary tube 1 along a track as shown in Fig.3(c) to bend and to curve said bonding wire 4 so that said first and second parts

of said bonding wire being lying directly on each other and including one reverse bend (i.e. forming a crowing 8); and said second part of said bonding wire is folded onto and joined said first part of said bonding wire on said conductive layer 9/13.

Therefore, at the time the invention was made, one of the ordinary skill in the art would have been motivated to utilize the two-step bonding as taught by Masahiro et al. in AAPA's method for bonding two conductive layers. The motivation/suggestions for doing so would be to provide a simple means for bonding conductive layers without being restricted to a special bump's structure; shortening a junction distance between two conductive layers; and improving a bond strength (sections [0044] and [0045]; Masahiro et al.).

In re claim 4, AAPA teaches that the first conductive layer, which can be an inner lead 10, is connected to the first ball 2; and that the second conductive layer, which is the bonding pad 6, is connected to a second ball 9.

5. Claims 5 and 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over AAPA in view of Masahiro et al. as applied to claims 1, 4, 7, 9 and 10 above, and further in view of Hikita et al. (US 6,133,637).

AAPA in view of Masahiro et al. substantially teaches the claimed device except that the device comprises a base; a first and a second semiconductor element mounted on the base with a die pad interposed between the base and the semiconductor elements; an external terminal on the rear surface of the base; and a sealing resin sealing the first and the second semiconductor elements.

However, Hikita et al. in an analogous art teach a device (Fig. 25), comprises a base 50, a first 14 and a second 16 semiconductor element mounted on the base 50 with a die pad 21

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interposed between the semiconductor element 14 and the base 50; a sealing resin 22 sealing the semiconductor elements 14 and 16; an external terminal 60 on the rear surface of the base 50; a bonding pad 14a on the first semiconductor element 14; and a bonding pad 16a on the second semiconductor element 16.

Therefore, it would have been obvious to one of the ordinary skill in the art at the time the invention was made to incorporate the device configuration of Hikita with the device of AAPA in view of Masahiro et al since by this manner it would provide a resin-packaged semiconductor device having a plurality of semiconductor elements, which, in turn, would reduce the manufacturing cost of stacked chips (col. 25, lines 14-20, Hikita et al.).

Conclusion

6. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).


A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.


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7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Hsien-Ming Lee whose telephone number is 703-305-7341. The examiner can normally be reached on M-F (9:00 ~ 5:00).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Olik Chaudhuri can be reached on 703-306-2794. The fax phone numbers for the organization where this application or proceeding is assigned are 703-305-0142 for regular communications and 703-305-0142 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.


Hsien Ming Lee
February 19, 2003


Olik Chaudhuri
Supervisory Patent Examiner
Technology Center 2800